

DISCUSSION OF THE AMENDMENT

Claims 1-20 are active in the present application. Claims 8-11 are presently withdrawn from prosecution. Claims 3 and 7 are amended. The amendment to Claims 3 and 7 for clarity is supported by the disclosure on the first full paragraph on page 9 of the specification. Support for new Claims 12-20 is found on page 9, lines 5-6.

No new matter is added.

### REQUEST FOR RECONSIDERATION

The Office Action of August 16, 2006 rejected Claims 1, 3 and 7 for failing to point out and distinctly claim the subject matter regarded as the invention. The Office Action provides no explanation or basis for the rejection of Claim 1 on this ground. Applicants assume that the recitation of Claim 1 in paragraph no. 2 on page 2 of the August 16, 2006 Office Action is a typographical error. Applicants further submit that the amendment to Claims 3 and 7 obviates the rejection under 35 U.S.C. § 112, second paragraph.

The Office rejected the claims drawn to a silica glass crucible in view of prior art to Tsuji (U.S. 6,524,668) and Hellmann (U.S. 6,150,006). Applicants traverse the rejection on the ground that the cited prior art does not disclose all of the present claim limitations and further on the grounds that the Office provided no motivation for combining the Tsuji and Hellmann prior art.

At the outset, Applicants note that it is an explicit limitation of present independent Claims 1, 6 and 7 that the silica glass crucible have grooves having a depth of from more than 3  $\mu\text{m}$  to less than 30  $\mu\text{m}$ . Applicants submit this limitation is not disclosed or suggested by either of Tsuji or Hellmann.

The Office concedes in paragraph no. 3 of page 3 of the August 16 Office Action that Tsuji is silent with respect to this feature of the presently claimed invention:

Tsuji ('668) teaches a silica glass crucible (col. 3, ll. 25-34 and FIG-1, quartz which is silica), however fails to expressly disclose wherein at least an outer surface of a wall part of the crucible is covered with fine grooves having a length of less than 200  $\mu\text{m}$ , a width of less than 30  $\mu\text{m}$  and a depth of from more than 3  $\mu\text{m}$  to less than 30  $\mu\text{m}$  ...

Applicants submit that those of ordinary skill in the art would not expect that the groove feature recited in the present claims would not be a feature of the Tsuji crucible in view of the integrated/composite structure of the Tsuji crucible and the way that it is made.

The crucible of Tsuji is a composite that is made by melting or vitrifying quartz glass powder inside a form made of a carbonaceous material, e.g., such as a carbon susceptor (column 2, lines 25-31 and column 2, lines 42-53 of Tsuji). By forming the prior art composite crucible in this manner, a quartz glass layer and a carbon crucible layer are integrally connected to one another (column 3, lines 12-15 of Tsuji). When the Tsuji crucible is made, the melted glass enters voids and imperfections in the prior art carbon mold (see column 4, lines 6-12 of Tsuji).

Applicants submit that the Tsuji crucible has surface features that are defined by the way the prior art crucible is made, e.g., because melted glass flows into voids present in the carbonaceous mold and thereby forms bumps on the surface of the glass. Thus, the surface features of the Tsuji crucible are concaves and convexes and not grooves. Applicants submit that the Tsuji method provides a glass layer that cannot have the fine grooves of the present claims.

Applicants submit that the rejection of the present claims as obvious in view of Tsuji makes no sense because Tsuji, at best, discloses the formation of concave and/or convex features but does not disclose the formation of any fine grooves.

Moreover, the Office provided no motivation or reasonable technical explanation of how one of ordinary skill in the art could form the surface features disclosed in Hellmann on the Tsuji carbonaceous material given the fact that their preparation is substantially different, and further given the fact that the Tsuji glass layer is covered by a carbonaceous layer that would prohibit further modification of the Tsuji crucible.

Applicants further traverse the rejection on the grounds that Tsuji and Hellmann represent non-analogous art (see MPEP § 2141.01(a)). For example, Tsuji may disclose composite crucibles that contain a quartz layer and a carbonaceous layer. The Tsuji crucible may be used to manufacture silica boules (e.g., in a CZ process). In contrast, Hellmann

discloses a quartz glass component that may be present, e.g., on a substrate, and that has surface features suitable for the adhesion of a layer formed by CVD (i.e., chemical vapor deposition).

Applicants submit that the preparation of a silica crystal from a quartz glass crucible is a different process than the process of preparing layers via chemical vapor deposition. When pulling single crystal from a molten bath of silicon in a quartz glass crucible (e.g., in a CZ process), the temperature of the molten silicon may be 1500°C or higher and the process may take place at a pressure of about 20 to 200 torr in an argon atmosphere. In contrast, chemical vapor deposition takes place in vacuum chambers under very different conditions such as low pressure (e.g., less than 10 torr) and at temperatures that are lower than 1500°C. Thus, one of ordinary skill in the crucible art would not necessarily turn to the chemical vapor deposition art for a relevant teaching on how to improve or change a quartz glass crucible.

Importantly, Hellmann does not disclose or suggest that the prior art surface features are in contact with a carbon-containing surface. In fact, to the contrary, Hellmann discloses treating a quartz-covered substrate with, e.g., an etching acid, to form the surface features. The thus-formed surface features are disclosed to be advantageous for the adhesion of coatings subsequently applied by CVD. There is no disclosure or suggestion in Hellmann that the prior art surface features may be advantageous for improving adhesion to a carbon form, such as a carbon susceptor.

Applicants submit that the Office's assertion that the presently claimed invention is obvious in view of the combination of Tsuji and Hellmann is merely hindsight recognition of the claimed invention. The Office combines a reference that discloses a quartz glass crucible having a quartz layer and a carbonaceous material layer with a disclosure of a quartz layer

that may have certain structural features and therefrom concludes that the claimed invention is obvious.

In asserting a *prima facie* case of obviousness the Office failed to answer some basic questions; namely, (i) why would one be motivated to use the surface features of Hellmann in the crucible of Tsuji, and (ii) how would the cited prior art enable one to use the surface features of Hellmann in the crucible of Tsuji?

As mentioned above, the Office further failed to provide any basis from which one of ordinary skill in the art could form the surface features of Hellmann on the quartz of Tsuji given the fact that the Tsuji quartz glass layer must be formed by melting it into a carbonaceous mold to thereby form an integral composite.

Applicants further draw the Office's attention to the Examples of the specification on pages 9-10. Applicants provide a showing that a crucible adhering to the present claims limitations (e.g., a crucible having the groove feature recited in the present claims), has a significantly higher frictional coefficient than a crucible that does not have the groove feature of the present claims. The crucible meeting the claim limitations is able to avoid sinking or buckling and provides a way for increasing the rate at which a silicon single crystal can be pulled from a bath of molten silicon (see page 10, paragraph [0017]).

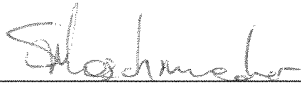
For the reasons discussed above, Applicants submit the presently claimed invention remains patentable and respectfully request withdrawal of the rejections.

Respectfully submitted,

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